ELM Destabilization by Resonant Magnetic Perturbations at NSTX

J. Canik

The destabilization of edge-localized modes (ELMs) by the application of resonant magnetic perturbations has been observed on the National Spherical Torus Experiment. The perturbation is applied using a set of midplane coils external to the vacuum vessel, in an n=3 configuration. When the external field is applied during an otherwise ELM-free period of a discharge, ELMs begin within 50 ms, with an apparent threshold perturbation level necessary for the triggering to occur. Calculations assuming vacuum perturbation fields as well as simulations using the Ideal Perturbed Equilibrium Code (IPEC) predict an ergodization of the edge magnetic field due to the perturbation. However, no strong changes in the pedestal electron temperature and density profile are observed, although the toroidal rotation is reduced due to braking by the applied field. The characteristics of the triggered ELMs are dependent on plasma shape, with ELMs being smaller and more frequent at higher elongation. This magnetic triggering has been used as an ELM-pacing technique to reduce impurity accumulation in the high-confinement, ELM-free H-modes that occur with lithium conditioning.